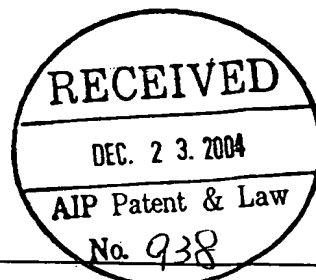


PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
APPLICATION AS PUBLISHED OR REPUBLISHED

To:

LEE, Soo-Wan
1901-ho, Keungil Tower 19F
677-25 Yeoksam-dong
Gangnam-gu
Seoul 135-914
RÉPUBLIQUE DE CORÉEDate of mailing (day/month/year)
09 December 2004 (09.12.2004)Applicant's or agent's file reference
P04-5003

IMPORTANT NOTICE

International application No.
PCT/KR2004/001153International filing date (day/month/year)
14 May 2004 (14.05.2004)Priority date (day/month/year)
28 May 2003 (28.05.2003)

Applicant

SEOUL SEMICONDUCTOR CO., LTD. et al

The International Bureau transmits herewith the following documents:

- ☒ copy of the international application as published by the International Bureau on 09 December 2004 (09.12.2004) under No. WO 2004/107461
- ☐ copy of international application as republished by the International Bureau on under No. WO
- For an explanation as to the reason for this republication of the international application, reference is made to INID codes (15), (48) or (88) (as the case may be) on the front page of the attached document.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Philippe Becamel

Facsimile No.+41 22 740 14 35

Facsimile No.+41 22 338 70 90

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
9 December 2004 (09.12.2004)

PCT

(10) International Publication Number
WO 2004/107461 A1

(51) International Patent Classification⁷: **H01L 33/00,**
23/34

(21) International Application Number:
PCT/KR2004/001153

(22) International Filing Date: 14 May 2004 (14.05.2004)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2003-0033989 28 May 2003 (28.05.2003) KR
10-2003-0067949
30 September 2003 (30.09.2003) KR

(71) Applicant (for all designated States except US): **SEOUL SEMICONDUCTOR CO., LTD.** [KR/KR]; 148-29 Gasan-dong, Geumcheon-gu, Seoul 153-801 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HAN, Kwan Young** [KR/KR]; 105-2412 Woosung APT., 1707 Bongcheon-dong, Gwanak-gu, Seoul 151-050 (KR). **PARK, Kwang Il** [KR/KR]; 302 Sunwoo village, 909-19 Bongcheonbon-dong, Gwanak-gu, Seoul 151-840 (KR). **CHO, Jae Ho** [KR/KR]; 139-204 Singongdeok-dong, Mapo-gu, Seoul 121-853 (KR). **SEO, Jung Hoo** [KR/KR];

862-5 Siheungbon-dong, Geumcheon-gu, Seoul 153-857 (KR). **RYU, Seong Ryeol** [KR/KR]; A-402 Jeongwha Villa, 34-2 Sosa-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do 420-818 (KR).

(74) Agents: **LEE, Soo-Wan** et al.; 1901-ho, Keungil Tower 19F, 677-25 Yeoksam-dong, Gangnam-gu, Seoul 135-914 (KR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

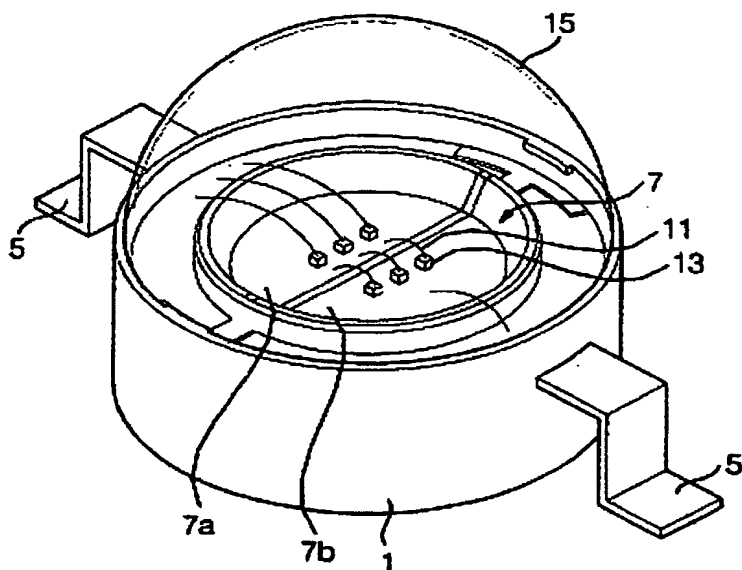
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- with amended claims

[Continued on next page]

(54) Title: LIGHT EMITTING DIODE PACKAGE AND LIGHT EMITTING DIODE SYSTEM HAVING AT LEAST TWO HEAT SINKS



(57) Abstract: There is provided a light emitting diode package having at least two heat sinks. The light emitting diode package includes a main body, at least two lead terminals fixed to the main body, and at least two heat sinks of electrically and thermally conductive materials, the heat sinks being fixed to the main body. The at least two heat sinks are separated from each other. Thus, high luminous power can be obtained mounting a plurality of light emitting diode dies in one LED package. Further, it is possible to embody polychromatic lights mounting LED dies emitting different wavelengths of light each other in the LED package.

WO 2004/107461 A1



Date of publication of the amended claims: 14 April 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AMENDED CLAIMS

[received by the International Bureau on 02 November 2004 (02.11.04);
original claims 1-14, replaced by amended claims 1-14]

Claims

1. A high power light emitting diode package comprising:
a main body;
at least two lead terminals fixed to the main body; and
5 at least two heat sinks of electrically and thermally conductive materials, the
heat sinks being separated from each other and fixed to the main body.
2. The package of claim 1, wherein each of the at least two heat sinks has a
reflective surface extended from an upper surface thereof.
- 10 3. The package of claim 1, wherein the at least two heat sinks are a pair.
4. The package of claim 3, further comprising:
at least one light emitting diode die mounted on upper surfaces of the at least
15 two heat sinks, the die being directly and electrically connected to the heat sinks
through a surface of the die.
5. The package of claim 4, further comprising:
bonding wires electrically connecting the at least two lead terminals, the at least
20 two heat sinks and the at least one light emitting diode die.
6. The package of claim 4, further comprising:
a lens attached to the main body, the lens enclosing the at least one light emitting
diode die.
- 25 7. The package of claim 6, wherein the lens includes an optically transparent
material which is directly contacted with the at least one light emitting diode die.
8. The package of claim 4, further comprising:
30 a fluorescent material converting the wavelength of light emitted from the at
least one light emitting diode die.

9. The package of claim 1, further comprising:

light emitting diode dies mounted on the respective heat sinks, the light emitting diode dies emitting different wavelengths of light.

5 10. The package of claim 9, wherein the at least two lead terminals include:
lead terminals electrically connected to the at least two heat sinks respectively;

and

a common lead terminal electrically connected to all of the at least two heat
sinks.

10

11. The package of claim 10, further comprising:

an additional heat sink; and

a zener diode mounted on the additional heat sink.

15 12. The package of claim 9, wherein the light emitting diode dies include light
emitting diode dies emitting a first wavelength of light, a second wavelength of light
and a third wavelength of light, respectively.

20 13. The package of claim 12, wherein the first wavelength, the second
wavelength and the third wavelength are red wavelength, green wavelength and blue
wavelength, respectively.

14. A light emitting diode system comprising:

the light emitting diode package according to claim 10 or claim 11; and

25 a controller for controlling the electric power supplied to the light emitting
diode package,

wherein the controller controls the amount of the current supplied to the
respective heat sinks.

30

From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
APPLICATION AS PUBLISHED OR REPUBLISHED

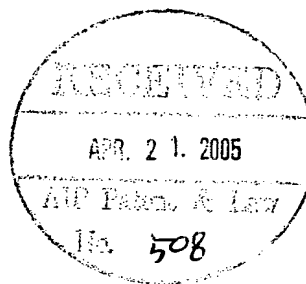
To:

LEE, Soo-Wan
1901-ho, Keungil Tower 19F
677-25 Yeoksam-dong
Gangnam-gu
Seoul 135-914
RÉPUBLIQUE DE CORÉEDate of mailing (day/month/year)
14 April 2005 (14.04.2005)Applicant's or agent's file reference
P04-5003**IMPORTANT NOTICE**International application No.
PCT/KR2004/001153International filing date (day/month/year)
14 May 2004 (14.05.2004)Priority date (day/month/year)
28 May 2003 (28.05.2003)

Applicant

SEOUL SEMICONDUCTOR CO., LTD. et al

The International Bureau transmits herewith the following documents:

copy of the international application as published by the International Bureau on under
No. WOcopy of international application as republished by the International Bureau on 14 April 2005 (14.04.2005) under
No. WO 2004/107461For an explanation as to the reason for this republication of the international application, reference is made to INID codes (15), (48)
or (88) (as the case may be) on the front page of the attached document.The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Philippe Becamel

Facsimile No.+41 22 740 14 35

Facsimile No.+41 22 338 70 90